2020

VIRTUAL COACHING CHINESE PARENTS TO USE NATURALISTIC COMMUNICATION INTERVENTION WITH CHILDREN WITH SPECIAL NEEDS

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Digital Object Identifier: https://doi.org/10.13023/etd.2020.345

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VIRTUAL COACHING CHINESE PARENTS TO USE NATURALISTIC COMMUNICATION INTERVENTION WITH CHILDREN WITH SPECIAL NEEDS

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Education
at the University of Kentucky

By
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Lexington, Kentucky

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Lexington, Kentucky

2020

ABSTRACT OF DISSERTATION

VIRTUAL COACHING CHINESE PARENTS TO USE NATURALISTIC COMMUNICATION INTERVENTION WITH CHILDREN WITH SPECIAL NEEDS

Effective early communication intervention is essential for preventing long-term, language-related problems for children with special needs. Particular for young dual language learner, supports provided family members in their home language can effectively promote development of communication skills in both home language and English. To help Chinese parents better support their children's communication needs at home, this study applied a multi-component coaching intervention to teach parents to use a naturalistic communication intervention.

Using multi-probe single subject design, this study experimentally evaluated the effects of coaching intervention on parents' acquisition of naturalistic intervention. The coaching intervention included a video-based training session, pre-practice discussion and post-practice structured feedback. Coaching intervention was delivered to parents in Mandarin Chinese, and parent practiced naturalistic intervention with their children in Mandarin Chinese. Results show that the coaching intervention was effective for teaching three parents to use naturalistic intervention. Each parent received 30 to 60 minutes of coaching. A functional relation was established between coaching intervention and parents' use of naturalistic procedures.

KEYWORDS: parent coaching, naturalistic communication strategies, early childhood, parent-implemented intervention.

Lin Zhu

08/02/2020

VIRTUAL COACHING CHINESE PARENTS TO USE NATURALISTIC COMMUNICATION INTERVENTION WITH CHILDREN WITH SPECIAL NEEDS

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DEDICATION

To parents and teachers of young children.

ACKNOWLEDGMENTS

This study was conducted in the middle of COVID-19 pandemic and moving process. I could not put it together without supports from my professors, study participants, my family.

My committee chair, Dr. Jennifer Grisham, went above and beyond through my doctoral program, she taught me to teach, to research, to serve, and to “grow up” into a faculty. Dr. Justin Lane guided my entire path of research, all my silly questions in the past 5 years have found their answers because of his patience. I am also very grateful for the amazing committee members served in my dissertation study, Dr. McCormick, Dr. Cantrell, and Dr. Salt, each of them taught me many important things in their own area of expertise.

In addition, my colleagues at ECL, Ms. Charlotte and Ms. Christy are my role models. I have learnt from the best and will forever see myself as a classroom teacher, and I can’t wait to share things they taught me to my future students. I also want to thank participants in this study, who provided maximum flexibility and were willing to learn from me.

Lastly, Shi, Emily and Meowy always supported my dream and had it come true, I am looking forward to our next adventure.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTON

Early childhood is a critical time for children to learn and develop fundamental skills that are likely to lead to long-term academic and social success. During this time, young children learn from interactions with people in their lives, such as caregivers, educators, and peers. For example, young children learn and refine language and social communication through early language input and social interactions with caregivers and peers (Hart & Risley, 1995; Moore, Barton, & Chironis, 2014), and these skills enable children to successfully express wants and interests, engage in reciprocal interactions with other children, and eventually experience success in school and future careers. Young children at-risk for or with disabilities are less likely than their same-age peers with typical development to display later cognitive, social, and literacy-related skills (Kaiser & Trent, 2007); thus, effective early intervention is essential for preventing long-term, language-related problems for this group of children.

In addition, many young children in the United States are learning English as a second language, while still acquiring their native language (Ballantyne, Sanderman, & McLaughlin, 2008). For children who are dual language learners (DLLs), they are more likely to be confronted with more challenges in early childhood years as they must acquire school-readiness skills while learning to speak their native language at home and a new language at school.

Naturalistic instructional approaches have been developed to help early childhood educators support children's participation and learning in inclusive settings while giving individualized support and instruction in the context of typically occurring classroom activities (Pretti-Frontczak & Bricker, 2004; VanDerHeyden, Snyder, Smith, Sevin, &

Longwell, 2005; Wolery & Hemmeter, 2011). Using child interests and initiations as opportunities to model and prompt language in everyday routines and activities, naturalistic language interventions have been widely used to promote a child's language and communication skills through verbal (e.g., spoken words) or nonverbal (e.g., gestures, signs) interactions between an adult and a child with special needs (Kaiser & Trent, 2007).

Results of numerous studies have consistently shown the effectiveness of naturalistic interventions on various language targets (e.g., total and spontaneous communication, complexity and length of utterances, diversity of vocabulary and multiword utterances; Kaiser & Trent, 2007) or various language forms (e.g., sign language; Wright & Kaiser, 2017)), across settings (Alpert & Kaiser, 1992; Hancock & Kaiser, 1996; Kaiser, Hancock, & Nietfeld, 2000). Findings of studies also support the effectiveness of training therapists and teachers to deliver naturalistic interventions (Hancock, Kaiser, & Delaney, 2002; Hemmeter & Kaiser, 1994).

Research has indicated effective intervention for young linguistically diverse learners requires systematic support of home language (Kohnert, Yim, Nett, Kan, & Duran, 2005). However, no study has been identified in the literature to teach Chinese-speaking parents to use naturalistic interventions in their home language. To address the needs of young children whose primary home language is other than English, this research is designed to teach Chinese parents to use a naturalistic intervention to increase initiations in their children. The naturalistic intervention includes responsive interactions and an instructional strategy termed as environmental arrangement and response(Lane, Ledford, et al., 2016). This research adds important information to the literature on fidelity of

implementation of naturalistic instructional strategy by parents who speak Chinese in their home environment.

1.1 Naturalistic Strategies

Snyder et al. (2015) identified four common features of naturalistic instructional strategies in their review of 43 studies of naturalistic instruction. First, instruction occurs in the context of typically occurring activities, routines, and experiences of a child. Second, the content of instruction focuses on the individual needs of the child to support the child's engagement in typically occurring activities. Third, the child initiates, and determines the direction of the activity. Fourth, strategies are implemented by adults, who typically interact with the child in their natural environment. Embedded instruction, which refers to providing instructional strategies within a child's daily occurring activieis, aligns with current recommendations for providing services to young children in a play-based format in typical settings using age-appropriate materials during play (DEC, 2014). Using naturalistic approaches to embed learning opportunities can effectively promote child engagement (Malmskog & McDonnell, 1999) and learning (Grisham-Brown, Schuster, Hemmeter, & Collins, 2000; Hanline & Fox, 1993) during typically occurring classroom activities. Evidence has shown that naturalistic approaches are effective in teaching preacademic, social, communication, motor, adaptive, and cognitive skills (Snyder et al., 2015)

Rooted in naturalistic approaches, many evidence-based communication interventions have been used to help children with special communication needs (Lane & Brown, 2016). For instance, environmental arrangement (EA) includes the caregiver making changes on the child's surrounding physical environment and controlling preferred

materials or activities. Commonly used EA strategies in research include: within view/ out of reach, assistance, inadequate or sabotage material, being silly, material of interest, and protest (i.e., do things the child does not want so the child has opportunities to request; Kaiser, Hemmeter, Ostrosky, Alpert, & Hancock, 1995). Environmental arrangement strategies support interactions between the adult and child. By using environmental arrangement strategies, adults may increase their awareness of communication opportunities, and notice of children's attempts to communicate. In other words, environmental arrangement supports and "sets the stage" for the use of the further instructional strategies (Kaiser, Ostrosky, & Alpert, 1993). EA strategies have been taught to and effectively implemented by caregivers and teachers in many studies to address language needs of young children, with one or more communication strategies (Hatcher, Grisham-Brown, & Sese, 2018; McCathren, 2010; Meadan et al., 2016; Woods, Kashinath, & Goldstein, 2004).

Another commonly used intervention is the interaction intervention (RII, Kaiser et al., 2000; Trent, Kaiser, & Wolery, 2005), which refers to a conversational approach that focuses on increasing adult responsiveness and establishing a more positive interaction between adults and children. During RII, the adult follows the child's lead and joins in the child's play activity, and reproduces the child's action. A review of RII (Kong & Carta, 2013) indicates that implementation of RII resulted in significant positive changes in adults' responsive behaviors and children's emotional and social-communicative outcomes. In addition to imitating a child's play action, narration of child's action, expansion and recasts of child's verbal expression are often used with RII to increase

children's language input and improve the complexity of children's language complexity (Roberts, Kaiser, Wolfe, Bryant, & Spidalieri, 2014; Roberts, Kaiser, & Research, 2012).

Milieu teaching is a communication intervention that is often combined with EA (e.g., selecting materials of interest) and RII (e.g., mirroring, turn taking) and instructional strategies (e.g., modeling, prompting) to support a child's language and communication development. Milieu teaching is conducted in the natural environment, includes embedded learning opportunities, and focuses on children's initiations. The purpose of environmental arrangement is to promote child engagement within activities and communication with the adult (Ostrosky & Kaiser, 1991), while responsive interaction techniques create opportunities for both social interaction and modeling new language (Rakestraw Jr & Weiss, 1981), and instructional procedures aims at prompting the use of new language forms (Hemmeter & Kaiser, 1994). Milieu teaching uses one of four behavioral interventions to promote expressive language: (a) verbal model of the target behavior; (b) mand- model procedure where an adult controls opportunities to use language (e.g., interrupt play and provide an open-ended question); (c) time delay presentation of a stimulus and a specific delay for an independent response (adult provides a verbal model if there is an incorrect response or no response; Roberts et al., 2014); and (d) incidental teaching (adult promotes initiations and expands verbal communication; Lane, Lieberman-Betz, & Gast, 2016). Using milieu teaching strategies can provide opportunities for children to practice new language in a functional context.

Many studies have examined the effectiveness of combining multiple interventions to promote children's language and communication skills. Ingersoll and Schreibman (2006) used a multiple-baseline design across five participants to assess the benefit of responsive

interactions for teaching object imitation to young children with autism. Two strategies were implemented in this study; contingent imitation and linguistic mapping. Contingent imitation involved the adult simultaneously reproducing all the child's actions with toys, gestures, and vocalizations in order to gain the child's attention. Linguistic mapping referred to the adult providing narration of the actions that the adult and the child were simultaneously performing in order to provide appropriate language models and to enhance correspondence. Results of this study showed that participants increased their imitation skills and generalized these skills to novel environments. In addition, participants increased their use of other social communicative skills, such as language, pretend play, and joint attention.

In a later study, Ingersoll (2011) used a randomized alternating treatments design to compare the effects of responsive interaction, milieu teaching, and a combined intervention for two preschoolers with special needs. In the responsive interaction condition, the adult located next to the child and described the child's play action using language at the child's language level. This condition provided enriched language input that included language modeling and expansions, while still offering opportunity for the child to respond. The milieu teaching condition included four milieu teaching strategies: model ("Car", "Drive car", p.111), mand ("Say, 'Car'", "Tell me what you want", p.111), questions ("What do you want?", "What color car?", p.111), and time delay ("restricting access with an expectant look", p.111). This condition was associated with an increase in the children's use of language targets. Results of this study demonstrated that milieu teaching promoted children's overall language and requests more than responsive

interaction, while responsive interaction increased children's comments more than milieu teaching.

Results of other studies have also shown the effectiveness of combining milieu teaching strategies with responsive interaction interventions to address increases in expressive language in young children with special needs (Friedman, Woods, & Children, 2015; Harjusola-Webb & Robbins, 2012; Hatcher et al., 2018). In these studies, teachers and caregivers were effectively trained and implemented responsive interaction techniques blended with milieu teaching interventions, with findings of positive children outcomes. Friedman and Woods (2015) applied a single-case, multiple baseline design to coach three Early Head Start teachers to use environmental arrangement strategies, responding, target talk, and mirroring. In this study, teachers increased their use of the target strategies in both play and activity routines, and children increased their rates of communication during the intervention.

In another study, Hatcher (2018) used a modified coaching method to teach parents to use four language support strategies; matched turns, expansions, time delays and milieu teaching prompts. The responsive interaction strategy *matched turns* was defined as mirror and mapping (imitation or labeling of child's play action), and language responsiveness. An *expansion* was defined as "adding one or more content words to the child's previous utterance" or "replacing and/or adding words to the child's previous utterance to make it grammatically correct" (p.35). *Time delay* refered to adult controlling access of wanted materials, offering choice to the child, and "setting up a routine in which the child expects certain actions and then waiting before doing the expected action again." (p.35) And milieu teaching strategy *verbal prompting* refered to asking open-ended questions or choice

questions, and use “say” prompts (Hatcher, 2018, p.35). Hatcher and colleague’s study took place in participants’ home settings and all child participants were reported with language impairment. Results showed that all parents acquired and demonstrated the use of each language support strategy at criterion levels over the course of the intervention, and all four children demonstrated gains in expressive language.

Harjusola-Webb and Robbins (2012) implemented a multi-component training intervention to teach teachers to use naturalistic communication interventions for preschool-aged boys with autism spectrum disorders in their preschool classrooms. The target strategies included: (a) commenting and labeling and modeling; (b) imitating; (c) expanding; (d) positive feedback and praise; (e) asking questions and providing choices; (f) responding; (g) following the child’s lead and joint attention; (h) turn taking; and (i) time delay. As a result of the training package, all teachers increased their use of target strategies, and as the teachers increased their use of the communication strategies, the researchers observed increase in children’s frequency of vocalizations, words, gestures, and multiple word utterances.

1.2 Coaching

Implementing evidence-based practices in typical context such as classrooms, homes, and communities is the most effective way to transfer those practices into positive outcomes for children. Therefore, it is essential to identify effective training methods for teachers and parents to support children’s special needs. In a meta-analysis of effective adult learning strategies (Dunst & Trivette, 2012; Dunst, Trivette, & Hamby, 2010), researchers reviewed 58 randomized controlled trial studies and identified six adult learning characteristics and 13 practices that were associated with positive learning

outcomes: a) introduction (presentations; pre-class learner activities; out-of -class learner activities; imagery; and a combination of dramatic readings and imagery); b) illustration (instructor demonstrations; instructor role playing; learner informed class/ workshop content; and instructional videos); c) implementing (real life learner application; learner role playing; real life learner application and role playing; problem-solving activities; and learner games and writing exercises); d) evaluating (instructor feedback/review; and learner assessment of strengths and weaknesses); e) reflecting (performance improvement reviews; learner journaling and instructor behavioral suggestions; group reflection on instructor feedback); and f) mastery (standards-based learner evaluation; and learner self-assessment). Training methods that (1) actively involved learners in using evidence-based intervention practices; (2) provided with coach feedback, guidance, and support; and (3) guided learner reflection on and self-assessment of mastery of new skills were reported to result in greatereffects on learner knowledge, skills, attitudes and self-efficacy beliefs than the ones that did not include these training techniques.

1.2.1 Adult Training on Early Communication Intervention.

Decades of research has provided a substantive empirical foundation on teaching teachers and caregivers to implement communication interventions with young children with special needs. Beginning in the 1990s, a number of studies promoted and examined multiple components of adult training methods, including lecture, video examples, feedback, review, homework, role-play, and modeling (Alpert & Kaiser, 1992; Hemmeter & Kaiser, 1994; Kaiser et al., 1995; Kaiser et al., 1993). With these training components, researchers effectively taught parents and teachers of children with cognitive or language delays to implement environmental arrangement and milieu teaching strategies in various environments, including home, clinic, and classrooms.

Later in the 2000s, rooted in previous training procedures, researchers extended coaching evidence by including participants from more diverse backgrounds. For example, some studies included adults from low-SES and with low educational levels (Delaney & Kaiser, 2001; Hancock et al., 2002), with multiple risk factors (Peterson, Carta, & Greenwood, 2005), and with developmental disabilities (McCathren, 2010). In these studies, researchers typically provided some or all components of the training procedure: (1) lecture that includes handout, role-play, or video examples to introduce new strategies to parents; (2) specific instruction about how to implement the strategies during interaction with the children; (3) modeling of the procedures by researcher; (4) homework that the adult practices newly-learned strategies with the child on their own; (5) coaching while the adult and child interacted; and/or (6) specific feedback given after the coaching. Results showed that all adult participants in these studies learned the strategies and generalized these strategies to their natural settings. Two studies reported that participants maintained

positive changes after the intervention (Hancock et al., 2002; Peterson et al., 2005). In another study, findings showed that adults whose primary language is other than English also can be effectively trained to implement naturalistic strategies (Hatcher et al., 2018).

According to Scheeler, Ruhl, and McAfee (2004), performance-based feedback in the coaching process should be specific, immediate, positive, and/or corrective. The coach should "provide feedback as close to the occurrence of teaching behavior as possible" (p.67). In more recent years, telehealth, an evidence-based service delivery model has been used to address service provider shortages for young children who are enrolled in Part C of the Individuals with Disabilities Education Act (IDEA) Early Intervention (EI) programs (Cole et al., 2016). Meanwhile, studies are now introducing new technologies into the adult training field to remotely provide training to teachers and parents. Projects like Parent Video Home Training (PVHT; van Balkom, Verhoeven, van Weerdenburg, & Stoep, 2010), Bug-in-ear (BIE; Ottley & Hanline, 2014), and i-PiCS (Meadan et al., 2016) have been used to promote parent/teacher coaching through on site/long distance, or web-based coaching, which enables more flexibility in time and location arrangements for schools and families.

Parent Video Home Training (PVHT) provides training to parents individually in their home setting by sharing and discussing video example of target conversation, recording parents' implementation, and using video feedback to teach parents to use conversational support strategies. Compared to a traditional, clinic-based, speech-language therapy program, PVHT showed significant short-term and long-term effects on children's mean length of utterance, grammar, language comprehension and conversational coherence.

Bug-in-ear (BIE) refers to a small, wireless, one-way communication instrument that allows the coach to provide ongoing coaching to the educator. In Ottley and Hanline's study (2014), teacher training began by the researcher discussing graphs created by each teacher's baseline data on their use of communication strategies. The teachers were instructed to select three out of ten strategies, and then the research described the strategy, provided a rationale, stated specific examples and non-examples, modeled the strategy, and asked the educators to practice the strategy through role-play. Later, the researcher provided BIE coaching during teacher-child interactions. As a result, educators improved in their implementation of at least one communication strategy, and each acquired strategy was maintained at moderate levels or better.

Using a tele-practice service-delivery model, Meadan et al (2016) demonstrated the effects of a training and coaching program on parent implementation of naturalistic strategies. Instead of traditional face-to-face training, the first part of parent-training was delivered from a distance in Skype sessions that included an overview of the social-communication intervention, reviewing handouts and flowcharts, watching a video example through shared screen, creating an action plan detailing how the parent would use each strategy, and addressing parents' concerns. The second part of the training package, coaching sessions, was also delivered through Skype meetings. First, the parent and the coach discussed the targeted strategy and developed a plan for implementation, and then the coach observed parent–child interactions. After the observation, the parent and the coach discussed the observation and the coach provided feedback about the parent's implementation. For every four coaching sessions, the parent also received a video clip of her interaction with the child with feedback.

1.2.2 Parent training

Many training practices and combinations of training practices (i.e., training packages) have evaluated how to teach parents to serve as the primary interventionist (Barton & Fettig, 2013), with specific attention given to evaluating potential active ingredients of commonly used parent-training packages. Such studies have found that coaching that incorporates performance-based feedback is a critical component of parent-training packages (Snyder et al., 2015). In addition to evaluating the components of effective training packages, it is also necessary to consider the feasibility of training practices and the dosage at which they need to be provided to achieve desired results. For families receiving early intervention services, contact with Part C service providers occurs for an average of 4 hours each month (IDEA Infant and Toddler Coordinators Association, 2014). To ensure that training provided to families through Part C services will likely result in parents acquiring skills needed to serve as intervention providers, the dosages of evaluated trainings should match the dosage of services that families typically receive.

1.2.3 A Brief Training Model

Based on the six adult learning characteristics (Dunst & Trivette, 2009; Dunst et al., 2010), a brief coaching model that mirrors common dosages provided through Part C early intervention service has been successfully used to teach parents (Lane, Ledford, et al., 2016), caregivers (Hatcher et al., 2018), and teachers (Shepley, Lane, Grisham-Brown, Spriggs, & Winstead, 2018) to use naturalistic strategies in a various of environments. Despite of slight differences in the implementation between the studies, these studies commonly implemented sessions rapidly (e.g., 4 minutes) with multiple sessions occurring per day, and provided structured feedback to the adult learners immediately after their use of target behaviors.

Lane et, al examined the effects of coaching two parents to use three naturalistic strategies in a clinic setting to improve their children's vocal communicative response and initiation. The three strategies included: 1) narration, referring to the parent describing child's movement or the object being played with; 2) imitation, referring to the parent reproducing the child's action with same, similar, or pretend object; and 3) environmental arrangement and response (EAR), referring to the parent controlling access of wanted object or activity and responding to the child's vocal request. The individual training process began with a didactic lecture that lasted for two to three minutes, included video examples of implementation of target strategy, a handout and review of expectations for the parent, and rationale of the naturalistic strategy; following the introduction, each parent was asked to practice the target behavior with their child during the four-minute coaching sessions, while an instructional coach provided behavior-specific praise for correct implementation, and directed parent's attention to opportunities to apply the strategy; after each coaching session, the researchers answered parent's questions, watched video example of the parent's implementation in coaching session, and discussed new ways to use the strategy in the following sessions. The feedback session typically occurred for two to three minutes. During the baseline condition, both parents exhibited minimal to no use of the three strategies. Once training started, parents immediately engaged in narration and imitation at levels at or above the target criterion, and remained above criterion level when coaching was finished for each behavior. One parent used EAR at criterion level at the first coaching session and remained close or above criterion, the other parent acquired EAR in five intervention sessions. The result indicated that a brief coaching procedure was effective for training parents to implement naturalistic strategies.

Using this brief coaching package, researchers also successfully taught caregivers, and preschool teachers of inclusive classrooms in a Guatemalan orphanage to use naturalistic instructional procedures within the context of their daily activities (Hatcher et al., 2018; Shepley et al., 2018). In Hatcher et al. (2018) the training of naturalistic language support strategies was provided to two caregivers that worked at a Guatemalan orphanage. All participants' primary language was Spanish, and a translator was used to translate training material and coaching. The three target strategies were environmental arrangement, expansions, and time delay with prompting. The coaching components included: a didactic lecture described the purpose of the session, using slides to introduce the new strategies. The lecture also included a discussion of child language target(s) between the instructor and caregiver, and instructor and caregiver role-played for practice (initial teach session only); practice sessions where adults were asked to practice the target strategy with their child in their daily routines. The coach provided behavior-specific praise and redirection of the caregiver's attention to opportunities to use the language support strategy during the adult-child interaction; post-session feedback in which the caregiver was encouraged to comment, ask questions or voice concerns on the last coaching session. During feedback sessions the researchers highlighted correct uses of target strategy in the last coaching session, and asked the adult to watch video from last session, then discussed new ways that the caregiver can use the strategy (p. 6).

In the Shepley study, the lecture lasted for 30 minutes, but practice/coaching sessions and feedback sessions were relatively rapid (5-8 minutes and 3-5 minutes). Prior to training intervention, both caregivers demonstrated one to zero use of the target strategies. Following intervention there was an immediate change in frequency of correct

implementation of all three. This study was similar to Lane et al (2016) and extended the use of the brief coaching model to a population of adults with lower educational level (six-grade and high school) compared to the previous study, in which both parents had bachelor's degree. Also, this study effectively dealt with the language barrier and was conducted at the children and caregiver's naturalistic environment.

In another study, the rapid coaching model was used to teach preschool teachers to apply system of least prompts (SLP), naturalistic language intervention (NLI), progressive time delay (PTD), and constant time delay (CTD) in their classrooms (Shepley et al., 2018). The researchers provided a didactic presentation in duration of 70 minutes, which included PowerPoint slides, handout, time to ask questions, and discussion, prior to coaching sessions to introduce each target strategy. Later, teachers participated in practice sessions that each lasted four minutes to implement the strategies with a target student. Different from the other studies (Hatcher et al., 2018; Lane, Ledford, et al., 2016), coaching was not provided during teachers' implementation, instead, structured feedbacks that included praise, correction, opportunity to model, role-play, and opportunities to ask questions occurred afterwards for two to three minutes each session. Similar to the other studies, the adult learners acquired target behaviors and some evidence of maintained implementation of behaviors was observed after intervention sessions.

1.3 Dual Language Learners

Young children learn language through interactions with their families and community. Many children use one language at home and need to use another language to communicate in their larger environment (Peña, 2016). Schools in the United States have faced rapid changes in student demographics with a concomitant increase in the number of

dual language learners. To remediate delays and prevent long-term communication and language-related difficulties in DLLs, early interventions that supports family-centered practice are recommended (DEC, 2014). In recent years, family-centered practices have increasingly expanded the role of parents as primary interventionists who can implement systematic procedures with fidelity (Friedman, Woods, & Salisbury, 2012). To ensure that parents can implement interventions correctly (i.e., as intended, with adequate dosage), effective and feasible adult training practices are necessary.

Researchers have acknowledged the advantages of supporting home language of DLL children with disabilities (Peña, 2016). For example, using both home language and school language may increase family engagement (Verdon, Wong, & McLeod, 2016), furthermore, for children with language impairment, supporting their home language provides more opportunities for them to hear effective language models and use the language they know (Peña, 2016). However, the majority of research on supporting the social communication skills of young dual language learners focuses on literacy skills. And no research has been identified that involves implementation of naturalistic communication interventions for DLL children in their home language.

1.4 Research Questions

The purpose of this study was to investigate the effects of using a brief intervention coaching model to virtually teach Chinese-speaking parents to use a naturalistic language intervention in their home settings with their children. To support parents to remediate delays and prevent long-term communication and language-related difficulties in their children, two research questions were used to guide the investigation of this study:

1.4.1 Is a brief coaching package functionally related to an increase in parents' use of naturalistic language intervention?

1.4.2 If parents increase use of naturalistic intervention, will they maintain and generalize the skills into other settings?

1.5 Significance and Implications of the Research

Over decades, naturalistic language interventions have been effectively taught to parents, teachers, and caregivers to support children with special language and communication needs. However, no published studies could be found which have taught Chinese-speaking parents to support their children's communication development with naturalistic interventions in their primary language. To address this need, this study examined the effects of a coaching package on Chinese-speaking parents' implementation of naturalistic language interventions. Traditionally, most coaching studies have provided many hours of coaching for adult learners; studies that evaluated coaching involved a mean of 27 hr of coaching (Artman-Meeker, Fettig, Barton, Penney, & Zeng, 2015). The brief training model (Hatcher et al., 2018; Shepley et al., 2018; Lane, Ledford, et al., 2016) has been successfully implemented to adult learners of diverse culture, linguistic, education backgrounds in a variety of settings, within three to five short visits. Adult learners who received this coaching model were able to implement and maintain the use of target strategies with children and have positive impact on children's communication skills. This study has implications for service providers and researchers because the results may demonstrate if the brief package is effective in a different language setting and through virtual meetings. This will help with future planning of service delivery and parent education.

CHAPTER 2. METHODOLOGY

2.1 Participants

Four parent-child dyads participated in the study. Participants were recruited from a local Chinese school in central Kentucky. After receiving an advertisement for this study, the principal of the Chinese school shared information with parents whose children attend the school, and interested families were instructed to contact the researcher to obtain more information about the study. After a phone call screening, four eligible parents met virtually with the researcher to review the consent form. A week later, the consent forms were signed and mailed back to the researcher (See Appendix A: Consent to Participant in a Research Study for Parents.).

This study included four parents and their children. Inclusion criteria for parents were as follows: (a) Mandarin Chinese was primary language at home; (b) no previous training in target intervention; (c) reside in Kentucky; (d) expressed concerns about their children's communication development. Inclusion criteria for children was age 2 to 8 years old, and at least one parent was willing to participate. Refer to table 1.1 for detailed children and parents' information. After a parent contacted the researcher and indicated interests, the researcher conducted a phone call meeting with the parent to determine the parent's eligibility.

Yen is a homemaker with a bachelor's degree in nursing. She was in her late 30s and lives with her daughter Rae and her husband. Rae was 4 years old during her participation in this study. Yen told the researcher that Rae's expressive language in Chinese was hard to understand because her sentences were broken, and she often used incorrect words. By participating this study, Yen hoped to increase more communication

in Chinese at home. Rae went to a private preschool 5 days a week since she was 3, she has no identified special needs. Rae spoke English at the development level of her age at school, and her parents tried to foster an environment that only includes Mandarina Chinese and their hometown dialogue at home.

Jin iwas a doctoral student studying research methods in education. She was in her late 30s and has a master's degree in media. Her household included her parents, her husband, Gianni (Gigi), and a younger sibling. Gigi was 6-year-old, and Jin indicated that Gigi often did not initiate for her needs and threw a tantrum when her needs were not fulfilled. Gigi went to Kindergarten and has no diagnosis of special needs. Jin informed the researcher that through her participation, she expected increased frequency in Gianni's initiated communication in Mandarin Chinese at home, because her grandparents only speak Chinese.

Sun is a homemaker who lives with an extended family, which includes her parents, her husband, her son Mike, and a younger sibling. During Sun's participation, she finished a doctoral degree in computer science. Mike was 6 years old at the time of participation. Prior to participation, Sun informed the researcher that Mike had moderate to severe symptoms of autism and speech delay, and he was diagnosed by a university hospital when he was three. Following the diagnosis, Mike received speech and occupational therapy services provided at his preschool. Mike continued receiving services at his elementary school, along with services provided by a private clinic. Sun indicated that Mike rarely initiated to peers, teachers and parents, and often did not respond to others' communication, regardless of the language being used. Sun's goal of participation in this study was to acquire accurate implementation of communication interventions, and help Mike increase

his initiated communication. When the researcher observed Sun and Mike's interaction, Mike was communicating with sentences that contained less than three words.

Yin is a healthcare staff member with a doctoral degree in pharmaceutical sciences. She lives with her husband and two sons. Her younger son, Jay, was diagnosed with speech delay at age of three by the hospital where she works. When this study took place, Jay was 5 years old and had received speech therapy service for over a year. Mom indicated that Jay spoke very fast in both English and Mandarin, he communicated with a lot of words, but not many uses of sentences. Therefore, her goal was to help Jay express himself in a more understandable manner. Due to the pandemic condition, all children, parents and family members stayed home throughout the study.

2.2 Researcher

The researcher served as the trainer and coach for this study. The researcher has a bachelor's degree in English and a master's degree in Literacy Education. She has five years' experience teaching preschool classroom, and is working toward her Ph.D. in interdisciplinary early childhood education. The researcher also has experience training caregivers to implement language interventions with young dual language learners with, or at-risk for, developmental delays, and her primary language was Chinese.

2.3 Data collectors

One data collector collected reliability data for this study. The data collector has a master's degree in interdisciplinary early childhood education, and also spoke Chinese. The data collector collected fidelity of implementation and inter-observer reliability data during baseline and intervention sessions, as well as procedural fidelity data for the training and coaching sessions.

2.4 Setting and materials

Except for the training component, all sessions were conducted virtually, when parents and children were in their home settings. For the training component, a link to the training video on Youtube, and a handout were provided to parents by email for training purposes, therefore setting of trainings could be the parents' own choice.

Probe, intervention, and maintenance sessions were conducted in an area of the home selected by the parent. As suggested by the researcher, the area was a place where the parent typically interacted with the child. The materials varied across children, activities, and homes. Throughout the study, sessions occurred in participants' dining room, living room, children's bedroom, and backyard. All materials and activities were provided as children's daily activities in their natural environment. Materials included blocks, Legos, dolls, doll house play set, cars, Play-Doh, balloons, books, flashcards, piano, markers, pencils, papers, and eating utensils. All sessions were conducted through Zoom (2019) on a laptop except for training, and parents used their mobile devices. The laptop was also used to record and upload the training video.

During training sessions, the researcher sent an email to parents that provided a link to training video and a handout. The parents was trained using a video that was created in Mandarin Chinese and included: a) a lecture that provided rationale and procedures of the target intervention; b) examples and non-examples of the target intervention; c) a video example of the researcher using the target intervention with a child; and d) contact information of the researcher with an opportunity to ask questions. Parents were also provided a handout that included procedures and rationales of target strategies (Appendix F: Parent training video and handout). Families used computers, smartphones, tablets, and

access to internet to participate in this study.

2.5 Target behaviors

Based on previous studies (Hatcher et al., 2018; Lane et al., 2016; Lane & Ledford, 2016; Ingersoll & Schreibman, 2006), the target intervention for parents was four responsive interactions (RI) strategies and an instructional strategy called environmental arrangement and responding (EAR). See Appendix D: Data Sheet for Parent Behaviors. Each are described below.

2.5.1 Responsive interactions (RI)

Responsive interactions allow parents to staying proximal to the child when playing. These strategies included: a) locate near the child, b) imitate child's play action with same, similar, or pretend items, c) describe the copied action or item being manipulated by the child with that action, d) pause for at least 1 second. Having the parent locate near the child prepared them for further interaction. Reproduction of child's action referred to the parent simultaneously copying the child-initiated play actions with same, similar, or pretend item to gain the child's attention (e.g., the child picked up a phone and placed it near the ear, the parent picked up an apple and placed it near her ear). Description of the copied action/material provided appropriate language models and enhanced correspondence (Ingersoll & Schreibman, 2006). And 1 second processing time was provided for each child to process the language model.

2.5.2 Environmental arrangement and responding (EAR)

EAR requires the adult to arrange the environment (i.e., control access to preferred items or activities) to create an opportunity for the child to vocally request, and allows the adult to respond contingently to a child's request. Steps for EAR includes a) controlling

access to child-desired materials or activities, b) waiting at least 3 seconds for the child to vocally request, c) giving access to the child if proper vocal request occurred, or d) providing a Chinese language model that matches the child's expressive language level (e.g., the child typically communicated with 3-5 words sentences, and the parent provided a language model "give me the balloon please") if the child demonstrated interest in the materials but did not vocalize, or the child requested but not in preferred language (e.g., the child requested in English, or in Chinese but the parent wanted to extend the expression), e) waiting for at least 3 seconds for the child to imitate the modeled language, f) giving the child access to the toy because the child imitated the model or indicated continued interest in the item, or g) removing the object if the child lost interest. Correct completion of the chain (or variations given the child's response) counted toward mastery.

All procedures were conducted by the researcher, and sessions conducted by parents occurred through Zoom meetings. All primary data were observed and collected by the researcher using a data sheet on her laptop when behaviors occurred during sessions. Reliability data were collected in the same manner by the secondary data collector. Target behaviors and mastery level were selected based on similar studies (Lane, Ledford, et al., 2016; Lane, Lieberman-Betz, et al., 2016). The mastery criterion was that parents accurately implemented 100% of the tasks for three consecutive sessions

2.6 Multi-Component Coaching Intervention

The independent variable in this study was a virtual coaching intervention that involved two parts: a training component that included a training video and a handout, and a coaching component that included pre-practice discussion and post-practice structured feedback. See table 1.2 for details of the coaching intervention. A training video was

created specifically for this study in Mandarin. It used pictures, video clips and audio narration to provide a rationale, expectation(s), procedures, and modeling of the naturalistic intervention. This 16-min video was posted on YouTube, refer to Appendix F for the link to view the video. A handout, written in Mandarin Chinese, that provide a summary of the rationale and procedures was shared with parents as part of training component (Appendix F).

In the coaching component, prior to each coaching session, parents participated in a pre-practice discussion consisted of offering opportunities to review the procedures, and opportunities to discuss possible implementation within current family routines/activities in the following coaching session. Immediately after, each parent implemented the target intervention, structured feedback was immediately provided, it included : a) praise when the parent correctly used procedures, b) suggestions for possible opportunities of implementation, c) corrective feedback on incorrect implementation, d) an opportunity to watch a video model of procedures, and e) an opportunity to ask questions.

2.7 Data collection and measurement

Using time sampling data collection method, as parents' implementations occurred and observations occurred virtually, all primary data were collected by the researcher using a data collection sheet on her laptop (see Appendix D). The data collector collected reliability data using the same method. Parent-performed procedures of both responsive interactions (RI) and environmental arrangement and response EAR) were scored as complete, incomplete, or not applicable. Any applicable but non-occurrence or incorrect performance of a procedure was scored as incomplete. A procedure was scored not applicable if there was no opportunity for implementation. For example, if the child

responded to parent's arrangement of environment in a preferred language, the parent had no opportunity to model the language.

2.8 Experimental Design

A multiple probe across participants design (Gast & Ledford, 2010) was used to determine the effects of the multi-component intervention on parents' fidelity of implementation of the target intervention. Intervention phases were introduced in a staggered fashion, therefore, the demonstration of functional relationship between the coaching package and parent's increased implementation of naturalistic intervention were replicated across parents.

Each participant participated in three phases for each of the three strategies: (a) probe, (b) intervention, and (c) maintenance. Data was collected during each of these phases. For the first parent received intervention, Yen, pre-intervention probes were obtained until a stable pattern of performance was established. Meanwhile, data collection sessions were also conducted for each of the other parents to assess pre-intervention levels. Once one parent started intervention phase, the next parent received measurement of pre-intervention levels. When the first parent reached mastery criterion during the intervention phase, probes were implemented to demonstrate maintenance of learned skills, and intervention was introduced to the next parent. This pattern was repeated until the effects of the intervention had been demonstrated across all the participants. The experimental decisions were made based on percentage of EAR procedures performed correctly by the parents. Mastery criterion for parents was completion of 100% of RII and EAR procedures for three consecutive sessions. Following a parent reaching the mastery criterion, training began with the next parent. To meet design standards (e.g., What Works Clearinghouse

[2017]), data were collected for a minimum number of four sessions with each parent in probe and intervention conditions. Taking families' daily routine and parents' schedule into consideration, the intervention was delivered to parents in the order of : Yen, Jin, Sun and Ying.

2.8.1 Procedures

Sessions were conducted with one or two parents for a total of 1 to 4 times per day, up to five days per week, for seven weeks (i.e., one parent received intervention sessions and another parent received probe or maintenance session in the same day). Each session lasted for 5 to 10 minutes, no noticeable differences in regards to length of sessions from probe to intervention sessions. Each parent engaged in 1 to 2 sessions per day. All sessions occurred at the participants' home environment, in Mandarin Chinese. A session was identified when a parent interacts with the child using naturalistic intervention. Families made decisions on materials used during sessions and locations sessions took place at, depending on natural family routine and activities when sessions occurred (e.g., eating lunch, practice piano, drawing pictures, playing in the backyard).

2.8.1.1 Probe sessions

Probe sessions occurred prior to a parent receiving any training. At the beginning of a probe session, the researcher asked the parent and child to engage in typical interactions that prompted the child's communication skills for no fewer than 5 and no longer than 10 minutes, in their primary language. The session started when parent indicated she was ready. No instruction or feedback was provided during probe sessions. The researcher provided reminders regarding length of the session at 5 minutes and 10 minutes after the session started. A session ended once the parent indicated they had displayed typical

interactions. The researcher provided reminders to parents regarding length of the session if a probe session occurred longer than 10 minutes. See Appendix E: Data Sheet for Procedural Fidelity (Probe and Maintenance)

2.8.1.2 Training and coaching sessions

Training began after a parent was observed for at least four probe sessions and the data trend was stable. After the final probe session, the parent received an email that provided a link to training video, and a handout that summarized the rationale and procedure of naturalistic intervention. The parent was asked to watch the video and handout in three days. At the end of the training video, contact information of the researcher was provided and the parents were encouraged to contact the researcher if they had questions. In addition, an opportunity of a Zoom meeting or phone call was provided after parent reviewed the video and handout if further assistance was needed.

Once a parent completed training procedures (see Appendix B: Procedures of Parent Training), the parent was asked to practice the trained behaviors with the child in coaching sessions (Appendix C: Procedures of Parent Coaching). Prior to coaching sessions, the parent was provided an opportunity to review the target behaviors, and an opportunity to discuss implementation within the activity where the session was about to occur. Similar to probe session, a coaching session started when the parent indicated she was ready to interact with the child using target behaviors, and a session ended when the parent finished implementation. Sessions lasted for about 5 to 10 minutes. No prompting or feedback was offered during the interaction except for the time reminder when the session was over 5 minutes and ten minutes. The researcher directly observed the parent's interactions and made notes on opportunities when the target instructional strategy could

be correctly used and times when the parent correctly used the target instructional. Immediately following the practice, the researcher provided structured feedback to the parent. The structured feedback consisted of a) praising specific occurrences of the parent engaging in the target behavior, b) highlighting missed opportunities or changes that the parent should make when using the strategy, c) providing an opportunity to watch a video model of the target behaviors through shared screen on Zoom, and d) asking if the parent had any questions. After receiving structured feedback, the parent conducted another coaching session with the child until the end of meeting or when the intervention was mastered.

2.8.1.3 Maintenance sessions

Maintenance sessions occurred after a parent mastered the target intervention. Maintenance sessions were identical to probe sessions. The researcher provided no prompting or feedback before, after, or during the sessions.

2.8.1.4 Generalization

For two of the four participants, Yen and Jin, their implementation of naturalistic intervention procedures was collected in generalized settings which were different from intervention settings. Generalization sessions occurred once during probe condition and once in maintenance condition for each of them. For Sun, one generalization session was conducted during probe condition.

2.8.2 Interobserver reliability

Using video clips of the researcher implementing naturalistic intervention procedures with a child, a data collector was trained to collected reliability data on parent implementation. The data collector was provided with Appendix D: Data Sheet for Parent

Behaviors, received a lecture that explained the definition of each behavior, and was offered opportunities to ask questions. Following the lecture, the data collector reviewed the video clips with the researcher and they both scored target behaviors with the data sheet. Once the researcher and data collector reached over 80% agreement on target behaviors, the data collector was considered reliable. She collected reliability data for 33.3% of the probe sessions and 26.3% of intervention sessions. Interobserver agreement (IOA) of parents' implementation of EAR was at 98% for probe sessions and 94.3% for intervention sessions. In addition, reliability data of pre-instruction interaction was also collected. Upon comparison of data collection by data collector and the PI, IOA for RI procedures was 96.4% during probe condition, and 100% during coaching condition. See table 1.3 for percentage of reliability data collected per participant and conditions. IOA agreement percentages were obtained by dividing the number agreements by the total number of agreements and disagreements and multiplying by 100. An agreement was identified when the PI and data collector obtained same score of a parent procedure, otherwise it was marked as a disagreement.

2.8.3 Procedural Fidelity

In addition, the reliability observer also collected procedural fidelity (PF) data on the researcher's implementation during 28.6% of probe condition and 26% of intervention condition, before, during, and after sessions. The researcher correctly implemented 100% of probe procedures, and 96.3% of intervention procedures correctly. The data collector also received the email sent to parents with the link to the training video and handout, and participated in zoom meetings after training. Therefore, procedural fidelity of training conditions was also collected by the data collector watching training video, and observe

the PI answering questions from parents. Table 1.4 shows the percentage of PF collected per participant and conditions. See Appendix B，C and E for checklists of procedure fidelity. A procedural fidelity percentage was calculated dividing the number agreements by the total number of agreements and disagreements and multiplying by 100. An agreement was defined when the data collector scored complete or not applicable on an intervention procedure, and a disagreement was when a procedure was scored as incomplete.

Table 2.1 Parent and Child Characteristics.

Parents		Yen	Jin	Sun	Ying
	Age	37	38	37	42
	Family Role	Mother	Mother	Mother	Mother
	Occupation	Homemaker	Doctoral Student	Homemaker	Healthcare Staff
	Highest Education	Bachelor's in Nursing	Master's in Media	PhD in Computer Science	PhD in Pharmaceutical Sciences
	Marital Status	Married	Married	Married	Married
Children		**Rae**	**Gigi**	**Mike**	**Jay**
	Age (yr)	4	6	6	5
	Gender	Female	Female	Male	Male
	Siblings	0	1	1	1
	Special needs	0	0	Autism, speech delay	Speech delay
	Receiving services	No	No	Speech therapy, occupational therapy	Speech therapy

Table 2.2 Components of Coaching Package.

Multi-media training	Training video 16 min	○ Provide purpose of the target intervention ○ Describe expectation and procedures ○ Video model example and non-example of target intervention ○ Prompt parent to consider possible scenarios of implementation at home
	Handout	○ Summarize rationale and procedures
Coaching	Pre-practice discussion	○ Offer an opportunity to review procedures ○ Offer an opportunity to discuss implementation within current activity
	Post-practice structured feedback	○ Praise specific correct use of intervention ○ Suggest possible opportunity of implementation ○ Corrective feedback on incorrect implementation ○ Offer an opportunity to watch a video model of procedures ○ Offer an opportunity to ask questions

Table 2.3 IOA for Each Parent Across Conditions

	Condition		
Parent	Probe	Intervention	Maintenance
Yen	40/87.5/100	28.6/100/92.8	25/100/100
Jin	25/100/100	37.5/100/95.2	N/A
Sun	33/100/92.8	25/100/100	N/A
Ying	33/100/100	N/A	N/A

Note. First number in a cell is the percentage of sessions reliability data were collected, second number is the mean percentage of agreement for parent accurately implemented RI procedures, and the third number is percentage of agreement for parent accurately implemented EAR procedures; N/A=not applicable is that parent did not receiving sessions for that condition

Table 2.4 Procedural Fidelity Data for Each Parent Across Conditions.

	Condition			
Parent	Probe	Training	Coaching	Maintenance
Yen	20/100	100/100	28.6/94.4	25/100
Jin	25/100	100/100	25/100	N/A
Sun	33/100	100/100	25/94.4	N/A
Ying	33/100	100/100	N/A	N/A

Note. First number in a cell is percentage of sessions procedural fidelity data were collected and the second number is the mean percentage of correctly implemented procedures by the researcher; N/A=not applicable is that parent did not receiving sessions for that condition

CHAPTER 3. RESULTS

Result for the parents' implementation of responsive interactions and EAR instructional strategy are presented in Figure 1.1. Data were visually analyzed with consideration of level, trend, variability, overlap, immediacy of effect, and consistency of effect across similar conditions (What Works Clearinghouse, 2017). For visual analysis purposes, all sessions were graphed in the timely order of occurrence on the value of the abscissa.

The multi-component coaching intervention was systematically applied for three of the four participating parents, for the fourth parent, Ying, four probe sessions and one coaching session were conducted in this study. Therefore, there were three attempts to demonstrate an effect within the single -case design. Data were collected across probe and intervention conditions for the first three parents, with at least four data points for each parent in each condition. For the first parent, Yen, four data points were also collected at maintenance condition, and one maintenance data was collected for the second and third parent, Jin and Sun. Before introduction of intervention for Yen, at least one probe session was conducted with the other parents (Jin, Sun and Yin). Once a parent mastered the target skills, a probe or maintenance session was conducted for the other parents.

3.1 EAR

3.1.1 Parent: Yen

Yen was the first parent who received coaching intervention. During probe sessions, Yen's implementation of EAR was at a stable level of 0% of the procedures, and a zerocelerating trend was observed. After five probe sessions, coaching intervention was introduced, and an immediate positive effect was observed on Yen's implementation of

EAR procedures. Seven coaching sessions took place before Yen reached the mastery criterion (100% implementation of procedures for three consecutive sessions). This was evidenced by an accelerating trend ranging from 33% to 100%. Following mastery of target skills, Yen completed four maintenance sessions with three out of four sessions at criterion, and one session above probe level and close to criterion level. All sessions were conducted in their living room where Rae typically engaged in free play with doll house and figures, except for generalization sessions. During probe and maintenance conditions, Yen completed one generalization session by engaging Rae in drawing lessons with markers and paint in her bedroom, generalization. Yen generalized 100% of the steps of the EAR intervention in maintenance condition.

3.1.2 Parent: Jing

Intervention was delivered to Jin after Yen met criterion. During probe sessions, Jin had a consistent, stable level of implementing EAR procedures at 0% with a zerocelerating trend. Following Yen's mastery of target skills, Jin was trained to use naturalistic intervention procedures. An immediate, positive improvement was observed in her implementation of EAR after the training. Following an immediate and abrupt change in level, a decelerating trend in a contra-therapeutic direction was observed in the data during the second and third intervention session. An accelerating trend in a therapeutic direction was observed in all subsequent sessions. One maintenance session was conducted for Jin, and she maintained at 100%. All intervention sessions occurred in Jin's living room and backyard where she interacted with both Gigi and a younger sibling by playing with play-doh, balls, digging dirt, and reading books. Jin had one generalization session during probe and maintenance conditions. The generalization setting was piano practice in the living

room. Jin generalized 100% of the stee-3ps of EAR intervention in maintenance condition.

3.1.3 Parent: Sun

Sun received training after Jin's mastery of target procedures. There was some variability during Sun's probe session of EAR, she correctly implemented 40% to 60% of the procedures. Once probe level data were stable, training was provided. There was a positive change in level and trend in Sun's use of the intervention and she reached criterion in four sessions. At the only maintenance session, Sun's implementation of EAR procedures was at 100%. All sessions took place in Sun's living room where she read and played with her son with flash cards, play-doh, lego, and balloons. Sun had one generalization session during probe condition at 40%, in that session Mike was riding bike with mom, a younger sibling, and a grandparent in the backyard.

3.1.4 Parent: Ying

Ying was the last parent to receive the intervention. Ying's probe sessions were stable at 0% of correct implementation of EAR procedures with a zerocelerating trend. She completed probe sessions and received one coaching session at 33% of implementation. Session stopped due to schedule arrangement at the time this paper was written.

3.1.5 Summary

Maintenance data for Jin and Sun remained at 100%. Yen presented three out of four maintenance data points at 100%, with one data point above all probe sessions. For sessions conducted in generalization settings, Yen and Jin's data display no meaningful differences comparing to sessions conducted in acquisition setting.

3.2 Responsive Interactions (RI)

During training and coaching, parents were taught to use RI procedures along with

EAR procedures. For a total of four RI procedures, parents engaged in range of 0 to 2 strategies during probe session, 1 to 4 procedures during intervention session, and 3 to 4 procedures during maintenance condition. At probe sessions, Yen displayed some use of RI procedures, including three occurrences of locating near the child, and one occurrence of imitation. For Jin and Sun, they were able to locate near the child in all probe session, no other RI procedures demonstrated. Positive changes of level were observed for all three parents when coaching intervention was introduced to them. On average, Yen's correctlyimplemented procedures were at 1 and 3.2, for probe and intervention respectively. Jing's average implementation of RI was at 3.1 for intervention condition, compared to 1 for probe condition. Sun's average implementation of RI was at 3 during intervention sessions, compared to 1 during probe sessions. Parents' correct implementation of RI procedures carried on after intervention was completed. Three of the four parents' maintenance data demonstrated level above probe and intervention condition. See Table 1.5 for additional information on parents' implementation of RI procedures, and Graph 1.2 for each parent's completed RI procedures across condition.

Table 3.1 Parents' Average Use of RI Procedures in Each Condition

Parent	Probe	Intervention	Maintenance
Ye	1	3.2	3.75
Jing	1	3.1	4
Sun	1	3	4
Yin	0.5	1	N/A

Note. In this table N/A means parent did not receive session in the condition.

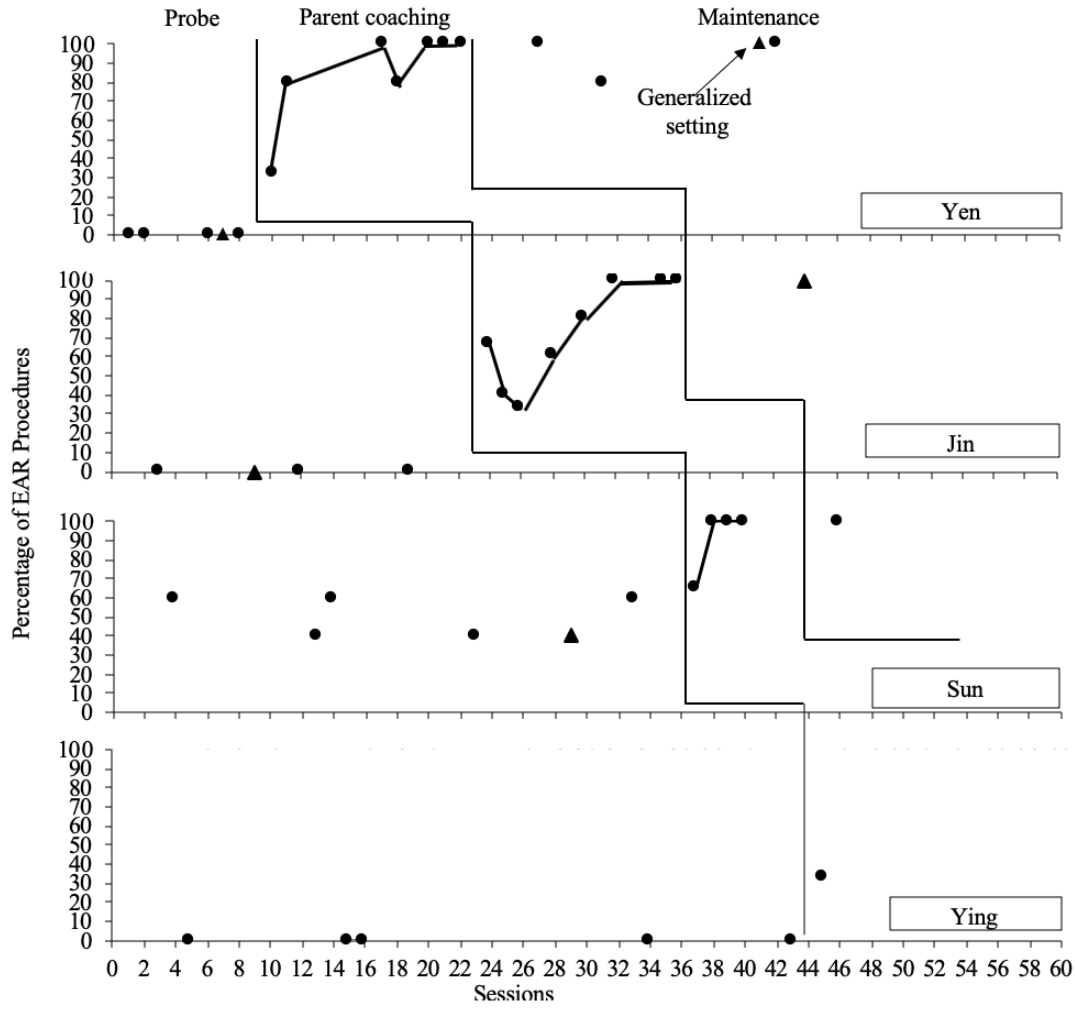


Figure 3.1 Percentage of Parents' Implementation of EAR Procedures

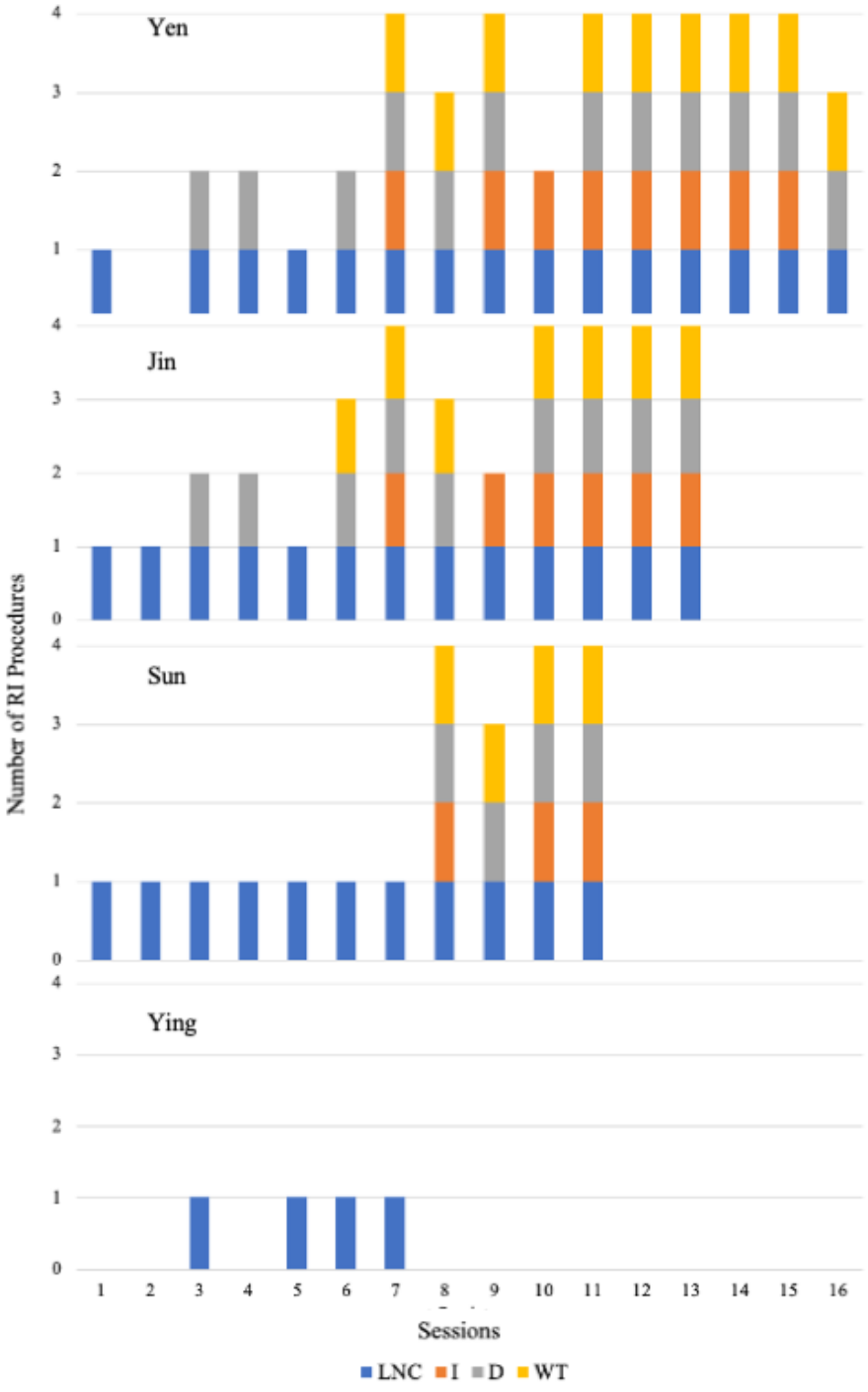


Figure 3.2 Parent's completed RI procedures

Note. LNC refers to Locate Near the Child, I refers to Imitation, D refers to Description, and WT refers to Wait Time.

CHAPTER 4. DISCUSSION

The purpose of present study was to investigate the effectiveness of a multi-component virtual coaching intervention on Chinese parents' correct implementation of naturalistic communication intervention. Results showed that following use of the coaching intervention, three parents effectively implemented the target behaviors, one of the parents (Yen) demonstrated the ability to maintain and generalize the skills, and another parent (Jin) demonstrated the ability to generalize acquired skills. Therefore, a functional relation was established between the virtual coaching intervention and parents' implementation of naturalistic communication intervention. This study extends current research on training parents to implement naturalistic communication intervention and provide guidance for future research conducted in a language other than English. The current study meets What Works Clearinghouse (WWC, 2017) Pilot Single Case Study Standards With Reservations: independent variable was systematic manipulated, dependent variable was measured systematically by more than one data collector, IOA was measured for over 20% of data points for each participant in each condition (at least 26.3% of data points in this study), IOA for dependent variable was above minimum acceptable values between 80% to 90% (at least 94.3% in this study), three demonstration of effects, and three or more data points per phase in each condition (at least 4 data points for each condition in this study). Beyond WWC (2017) standards, this study also collected procedural fidelity on each parent across all conditions for at least 25% of sessions, and the percentage of agreement was higher than 94.4%.

Parents' acquisition of target skills was relatively rapid. All three parents that completed coaching condition were able to master the target behaviors in no more than

eight sessions, and each session lasted for 5 to 10 minutes with exception of three sessions. In one intervention session for Jin and one probe session for Sun, the researcher provided a reminder when the session was exceding 10 minutes. In one maintenance session for Yen, she indicated that she finished implementation of the target behaviors within 5 minutes. Each parent acquired target skills in a week. During probe sessions, one parent (Sun) consistently used some EAR procedures (environment arrangement and give access of item to child) but remained below mastery criterion level. She reported attempts to observe and imitate the speech therapist's use of communication intervention when services were provided to Jay. Maybe due to prior experience with EAR procedures, Sun rapidly achieved mastery within 4 session, which occurred in two Zoom meetings. One explanation of the relatively rapid acquisition may be the coaching intervention was delivered in parents' native language, and when practicing the target skills, they also used native language to interact with children. Another possible explanation is all four parents are well-educated with degree above bachelor's degree.

Results of this study can provide guidance for future studies to identify the naturalistic intervention procedures that parents require more intense coaching. For Sun, Jin and Yen, the most frequently missed procedure was waiting for up to 3 seconds after environmental arrangement or language modeling. With structured feedback only, Sun accurately performed this procedure in one session. Yen and Jin required more intense coaching procedures including pre-practice review and discussion to acquire the procedure. This may be because Sun had some experience with EAR procedures before intervention, and she only needed to master one procedure to meet the criterion. Notably, prompting strategies are not common speech therapy interventions. Although Sun had experience

observing and acquiring a speech therapist' implementation of speech intervention, this coaching intervention was essential to Sun's 100% correct implementation of EAR procedures. Once parents mastered this procedure, they reached 100% procedures within 1 to 2 sessions. Another often missed procedure was to imitate children's play action. Parents often initiated a play action and requested the child to imitate their behavior. After receiving coaching specifically regarding this procedure, at least one correctly implementation of imitation was observed for all parents.

In comparison to previous research that applied the same brief coaching intervention to train adults to support preschool children (Hatcher et al., 2018; Lane et al., 2016; Shepley et al., 2018; Shepley, 2019; Zhu, Grisham-Brown, Shepley, & Lane, n.d.), this study included same primary teaching components. Similar to Shepley's (2019) study that taught preschool teachers to monitor child progress and make data-based decisions through direct behavioral observation, didactic lecture was delivered through training video and handout, which provided flexibility of scheduling and location to both parents and the researcher. Instead of providing on-going coaching while the adult was implementing naturalistic interventions in practice sessions (Lane et al., 2016; Zhu, Grisham-Brown, Shepley, & Lane, n.d.), this study provided opportunity to review procedures and discuss the windows for implementation prior to the practice sessions, which might be beneficial for parents to maintain and generalize the procedures when coaching was not provided. As with the other studies (Hatcher et al., 2018; Lane et al., 2016; Shepley et al., 2018; Shepley, 2019; Zhu, Grisham-Brown, Shepley, & Lane, n.d.), specific structured feedback was provided immediately following the adult's practice.

Data suggests that video-based training may be effective at increasing parents' use

of naturalistic intervention, ongoing coaching procedures are essential for parents to achieve 100% correct implementation of EAR procedures. This coaching intervention provided flexible and individualized instruction to parents. At the first session of intervention condition for Yen, she requested review of intervention procedures prior to practice procedures, but did not ask for discussion of possible implementation. From the second to the fourth coaching session, she received review and discussion before practice, positive improvement of her EAR implementation was observed. For Jin, she received both review and discussion throughout coaching condition. A younger sibling presented at all Jin's session and consisntly required attention. This may explain why Jin required more coaching procedures and coaching sessions compared to other parents. For all three parents that completed intervention sessions, they did not request for video modeling or ask questions after each coaching session.

Social and ecological validity data was not formally collected. Throughout this study, parents indicated that virtual training and coaching offered flexibility to their family schedule, and children were less likely to be distracted comparing to researchers in the house. After mastery of target skills, two parents indicated that they were more comfortable at meaningful interaction with the participating child and their siblings. A parent also suggested that grandparents would benefit from this coaching intervention, because in extended families grandparents often spend more time with children comparing to working parents.

This study extends previous research on training parents to use naturalistic communication interventions in several ways. First, parents were trained in their home environment as opposed to previous studies that provided training to parents in clinical

settings (Kaiser & Roberts, 2013; Lane et al., 2016; Roberts et al., 2014). In this study, virtual meeting provided flexibility to families' routine. In addition, parents were encouraged to wear earbuds when communicating with the researcher, and the researcher blocked her video image during all sessions to minimize distraction to child participants. Receiving training at home is beneficial for parents to generalize learned skills into family activities after this study. Second, this is the first study to provide coaching to parents in Mandarin Chinese, and parents interacted with children in Chinese throughout the study. One similar study was coaching caregivers to use naturalistic intervention in Spanish (Hatcher et al., 2018). Third, this coaching intervention was relatively rapid comparing to other parent coaching studies. For example, in Hatcher (2018), parents received one 60-minute home visit each week for 8 weeks. In other studies (Roberts et al., 2014; Roberts & Kaiser, 2015) parents received two 40-minute clinic sessions each week for 12 weeks, or 1 clinic session and 1 home session once a week for 3 months. Within 6 week, three parents successfully acquired target skills. Each session lasted for 5 to 10 minutes, one or two sessions took place in each zoom session that was scheduled at the family's convenience. On average, each parent received total 30-60 minutes of coaching. Although experimental decision was driven by parents' implementation of EAR procedures, parents received training and coaching on RI procedures in all intervention sessions. As a secondary source of evidence, parents' implementation of RI procedure across session indicated that this coaching intervention may be effective on increasing parents' correct use of RI procedures.

4.1 Limitation

A major limitation of this study is that data should be stable across all parents before introducing an intervention. When intervention was delivered to Tier 1 (Yen), probe data

in Tier 3 (Sun) was elevated and different than others and should have been extended. Another limitation of this study is incomplete intervention condition for Tier 4 (Ying), the effect of intervention was unpredictable for this parent, and it may positively or negatively impact the confidence of effectiveness of the coaching intervention. In addition, this study had more than eight sessions between probe sessions in Tier 4, which is not recommended by guidelines such as WWC (2017).

Parents' maintenance of acquired skills after coaching intervention was not completed for two parents. Only one parent (Yen) completed four maintenance sessions, data indicates that she was able to implement the skills without coaching procedures and demonstrated generalization of naturalistic intervention procedures in another family activity. Jin displayed accurate implementation of naturalistic intervention procedures in a generalized setting when coaching was completed, however, more maintenance sessions are needed to identify if she continues using naturalistic procedures after coaching.

A fourth limitation of current study is lack of further social validity data. Social validity data in this study was gathered through brief conversations during Zoom meetings, this method may influence parents' accurate feedbacks. Also, parents' motivation to participate in this study may influence social validity of the study. Topics included in the conversations were parents' opinion of this coaching intervention, parents' opinion of participating in the study through virtual meeting, and their opinion regarding children's progress. In this study, social validity data did not include parents' opinion on naturalistic intervention, and their willingness to continue using the procedures after this study. The last limitation in this study is children's age differences. Child participants in this study age ranged from 4 to 6, age differences may have effects on parents' implementation of

target skills because of exitance of developmental gap in additional to severity of children's special needs.

4.2 Future Studies

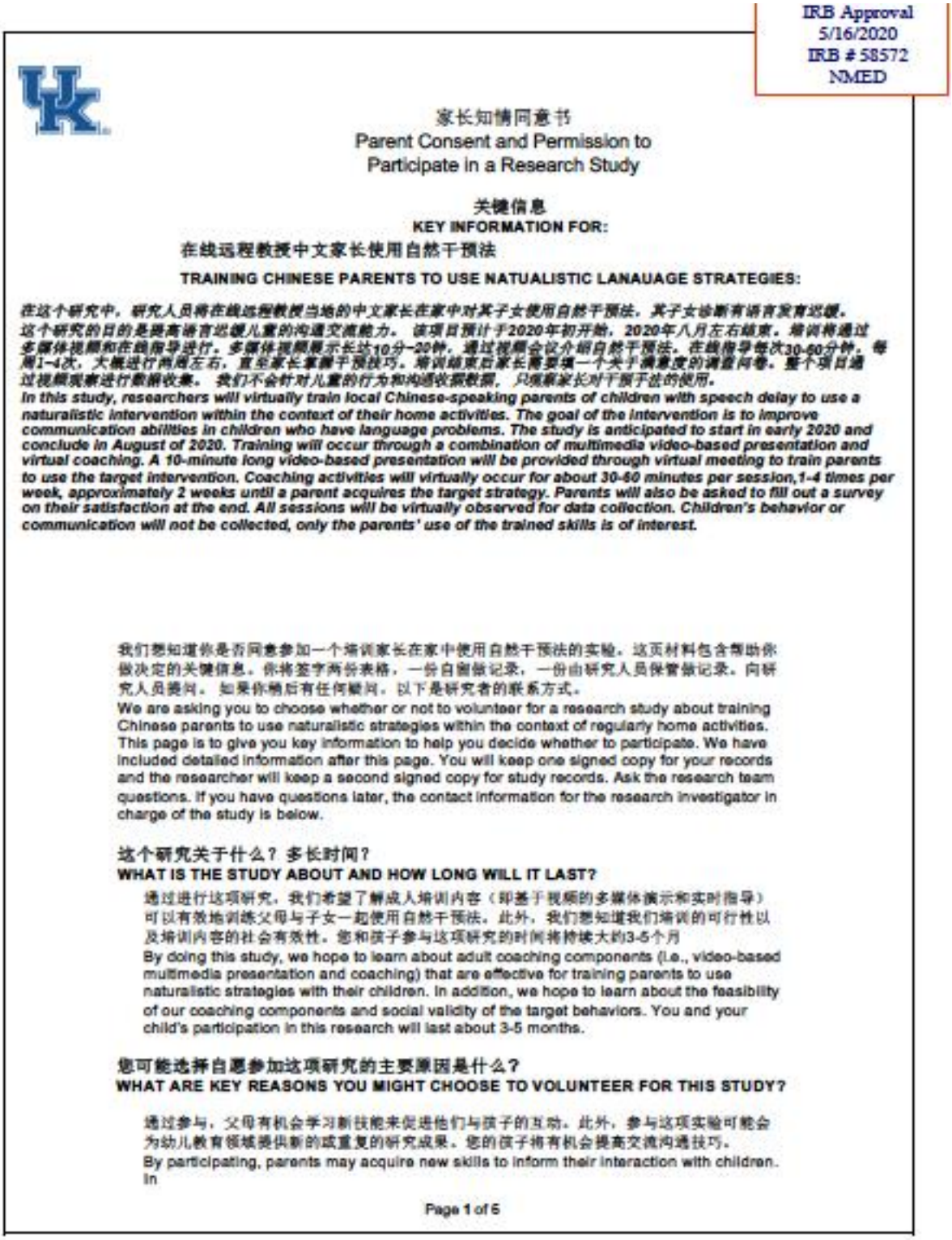
For future research, this study has several implications to be considered. First, participants in the future studies should have more diverse background (e.g., education, relationship to the child, socioeconomic status) to extend the external validity of this study's findings. Second, studies are needed on coaching parents to use naturalistic intervention in a different primary language. Such replication would investigate the effectiveness of this coaching intervention across languages. Third, this study did not include a social validity questionnaire or interview, future studies should consider conduct a questionnaire or interview to further investigate social validity of this coaching method and naturalistic communication intervention. Fourth, if video recording allowed, research is needed to assess effects of this parent coaching intervention on children's communication skills. Fifth, in addition to parents' implementation, child data can be collected as a separate study to further investigate the coaching intervention's impact on child behaviors.

4.3 Conclusion

Findings of this study indicated that a web-based multi-component virtual coaching intervention is effective for teaching Chinese parents to use naturalistic communication intervention with their children at home. More research is needed to further provide reliable evidence of parents' accurate use of naturalistic intervention during various home activities. This study adds to the literature supporting DLL families of children with communication needs.

APPENDICES

Appendix A: Consent to Participant in a Research Study for Parents



IRB Approval
5/16/2020
IRB # 58572
NMED

家长知情同意书
Parent Consent and Permission to Participate in a Research Study

关键信息
KEY INFORMATION FOR:
在线远程教授中文家长使用自然干预法
TRAINING CHINESE PARENTS TO USE NATUALISTIC LANAUAGE STRATEGIES:

在这个研究中，研究人员将在线远程教授当地的中文家长在家中对其子女使用自然干预法，其子女诊断有语言发育迟缓。这个研究的目的是提高语言迟缓儿童的沟通交流能力。 该项目预计于2020年初开始，2020年八月左右结束。培训将通过多媒体视频和在线指导进行。多媒体视频展示长达10分-20钟，通过视频会议介绍自然干预法。在线指导每次30-60分钟，每周1-4次，大概进行两周左右，直至家长掌握干预技巧。培训结束后家长需要填一个关于满意度的调查问卷。整个项目通过视频观察进行数据收集。 我们不会针对儿童的行为和沟通收据数据，只观察家长对干预手法的使用。
In this study, researchers will virtually train local Chinese-speaking parents of children with speech delay to use a naturalistic intervention within the context of their home activities. The goal of the intervention is to improve communication abilities in children who have language problems. The study is anticipated to start in early 2020 and conclude in August of 2020. Training will occur through a combination of multimedia video-based presentation and virtual coaching. A 10-minute long video-based presentation will be provided through virtual meeting to train parents to use the target intervention. Coaching activities will virtually occur for about 30-60 minutes per session,1-4 times per week, approximately 2 weeks until a parent acquires the target strategy. Parents will also be asked to fill out a survey on their satisfaction at the end. All sessions will be virtually observed for data collection. Children's behavior or communication will not be collected, only the parents' use of the trained skills is of interest.

我们想知道你是否同意参加一个培训家长在家中使用自然干预法的实验。这页材料包含帮助你做决定的关键信息。你将签字两份表格，一份自留做记录，一份由研究人员保管做记录。向研究人员提问。 如果你稍后有任何疑问，以下是研究者的联系方式。
We are asking you to choose whether or not to volunteer for a research study about training Chinese parents to use naturalistic strategies within the context of regularly home activities. This page is to give you key information to help you decide whether to participate. We have included detailed information after this page. You will keep one signed copy for your records and the researcher will keep a second signed copy for study records. Ask the research team questions. If you have questions later, the contact information for the research investigator in charge of the study is below.

这个研究关于什么？多长时间？
WHAT IS THE STUDY ABOUT AND HOW LONG WILL IT LAST?

通过进行这项研究，我们希望了解成人培训内容（即基于视频的多媒体演示和实时指导）可以有效地训练父母与子女一起使用自然干预法。此外，我们想知道我们培训的可行性以及培训内容的社会有效性。您和孩子参与这项研究的时间将持续大约3-5个月
By doing this study, we hope to learn about adult coaching components (i.e., video-based multimedia presentation and coaching) that are effective for training parents to use naturalistic strategies with their children. In addition, we hope to learn about the feasibility of our coaching components and social validity of the target behaviors. You and your child's participation in this research will last about 3-5 months.

您可能选择自愿参加这项研究的主要原因是什么？
WHAT ARE KEY REASONS YOU MIGHT CHOOSE TO VOLUNTEER FOR THIS STUDY?

通过参与，父母有机会学习新技能来促进他们与孩子的互动。此外，参与这项实验可能会为幼儿教育领域提供新的或重复的研究成果。您的孩子将有机会提高交流沟通技巧。
By participating, parents may acquire new skills to inform their interaction with children. In

Page 1 of 5

addition, participation may provide new or replicated research findings to support the field of early childhood education. For children, they may improve communication skills.

您可能选择不参加的主要原因是什么？
WHAT ARE KEY REASONS YOU MIGHT CHOOSE NOT TO VOLUNTEER FOR THIS STUDY?

您和孩子可以选择不参加本研究。因为除了您与您的孩子的日常互动外，您还需要进行新的教学干预。有关风险的完整说明，请参阅详细同意书。
You may choose not to participate, or not have your child participate in this study given that it will involve implementation of new instructional strategies in addition to your daily interaction with your child. For a complete description of risks, refer to the Detailed Consent.

您必须要参加研究吗？
DO YOU HAVE TO TAKE PART IN THE STUDY?

如果您决定和孩子参加研究，那应该是因为您和孩子确实自愿参加。如果您和孩子不选择自愿参加，您和孩子将不会失去通常拥有的任何服务、利益或权利。
If you decide to take part in and have your child take part in the study, it should be because you and your child really want to volunteer. You and your child will not lose any services, benefits, or rights you would normally have if you choose not to volunteer.

如果您有问题，建议或疑虑，该怎么办？
WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS OR CONCERNS?

如果您对本研究有疑问，建议或疑虑，或者想退出研究，请与肯塔基大学幼儿、特殊教育和康复咨询系的Lin Zhu 联系。联系信息是：Lin Zhu，肯塔基大学泰勒教育大楼229号，859-327-9360，lzh243 @ g.uky.edu。
如果您对作为志愿者从事这项研究的权利有任何疑问或疑虑，请在美国东部标准时间（周一至周五）8:00 AM至5:00 PM（美国东部时间）之间进行工作，并与肯塔基大学的工作人员联系。 研究诚信办公室（ORI）拨打 859-257-9428或免费电话1-866-400-9428。请留意ORI只提供英文沟通。
If you have questions, suggestions, or concerns regarding this study or you want to withdraw from the study, contact Lin Zhu of the University of Kentucky, Department of Early Childhood, Special Education, and Rehabilitation Counseling. The contact information is: Lin Zhu, 229 Taylor Education Building, University of Kentucky, 859-327-9360, lzh243@g.uky.edu.
If you have any concerns or questions about your rights as a volunteer in this research, contact staff in the University of Kentucky (UK) Office of Research Integrity (ORI) between the business hours of 8am and 5pm EST, Monday-Friday at 859-257-9428 or toll free at 1-866-400-9428. Please note that the ORI office can only communicate in English.

Appendix B: Procedures of Parent Training

Checklist for Naturalistic Intervention Training

+ = complete - = incomplete/incorrect o = not applicable

Session:_____ Parent:_____ Date:_____ Child: _____

Training Task	**Check when complete**
Provide a rationale for the strategy	
Provide procedures of the strategy	
Give examples of the strategy	
Give non-examples of the strategy	
Provide short video demonstrations of target strategy	
Prompt parent to imagine possible implementation within family activities	
Encourage parent to ask questions	
Answer parent's questions	
Number of completed procedures	
Percentage of completed procedures	

Appendix C: Procedures of Parent Coaching

+ = complete - = incomplete/incorrect o = not applicable

Session:_____ Parent:_____ Date:_____ Child: _____

	Procedures	**Check when completed**				
		1	**2**	**3**	**4**	**5**
1	Offer opportunity to review the target procedures					
2	Offer opportunities to discuss possible implementation within currently activity					
3	Ask parent to practice the strategy with the child					
4	Observe parent implementation with no feedback or prompt					
5	After practice, praise correct use of strategy					
6	Highlight missed opportunities of possible implementation					
7	Correct incorrect use of strategy					
8	Offer opportunity to ask questions					
9	Offer watching video modeling					
	Number of completed procedures					
	Percentage of completed procedures					

Appendix D: Data Sheet for Parent Behaviors

+ = complete - = incomplete/incorrect o = not applicable

Session:_____ Parent:_____ Date:_____ Child: _____

Responsive Interaction Procedures	1	2	3	4	5
1. Locate near the child					
2. Reproduce the child's movement ***Simultaneously imitating the child's action with same, similar or pretend item.*** • *Behavior must be child initiated*					
3. Verbally describe child's movement, or material being manipulated ***Providing narration of the actions that the adult and the child were simultaneously performing, or the material being played with using the action.***					
4. Wait for at least 1 second					
Number of completed interactions					

Environment Arrangement and Response Procedures	**Check when completed**				
	1	2	3	4	5
1. Rearrange the environment by controlling access of wanted activity or toy					
2. Wait for 3 seconds					
3. Give the child access					
4. Model the language					
5. Wait for 3 seconds					
6. Give the child access					
7. Remove item/stop activity					
Number of completed tasks					
Percentage of completed tasks					

Appendix E: Data Sheet for Procedure Fidelity (Probe and Maintenance)

+ = complete - = incomplete/incorrect o = not applicable

Session: _____ Parent:_____ Date:_____ Child: _____

	Procedure	**Check when completed**
1.	Wait for parent to get ready	
2.	Ask parent to interact with child	
3.	Observe parent behaviors and collect data	
4.	Provide no feedback, prompt or comment	
5.	Provide a reminder to parent when session excess 5 minutes.	
6.	Provide a reminder to parent when session excess 10 minutes.	
	Number of completed procedures	

Appendix F: parent training video and handout

家长您好！

请点开这个链接观看培训视频： https://youtu.be/D6z56S74BWI

视频时长 16 分钟，观看过程中讲解到案例时，请点开视频下方相应的案例视频，观看案例。

案例的视频我也发布在这个邮件里方便你查找。

另外这个邮件有一个附件，是关于自然干预法的大概内容。

有问题请随时跟我联系。

1. 复制的案例： https://youtu.be/b3Uxq7WKxwU

2. 复制的反例：https://youtu.be/RU5Fb-YohM4

3. 描述的案例：https://youtu.be/2nBxJEKP1JI

4. 描述的反例：https://youtu.be/p0wMzv9Ks8Q

5. 改变语言环境的案例：https://youtu.be/9YHjXZH2-C4

6. 改变语言环境的反例：https://youtu.be/ud4_4bf7wPg

7. 回应的案例-孩子给出正确沟通： https://youtu.be/UV3JUp7mtuk

8. 回应的案例-示范： https://youtu.be/3FH8utEbJkg

9. 回应的案例-重复示范： https://youtu.be/uA1SZoIDBzw

10. 回应的案例-孩子失去兴趣：https://youtu.be/HG84rRAojdQ

11. 自然干预法的整体展示：https://youtu.be/L0L6-YXfr38

祝好!

朱林

自然干预法

Naturalistic Communication Intervention

- 复制

  Mirroring

  成人模仿儿童的动作，使用相同，相似，或假装的物体

  The adult imitate child's play action with same, similar or pretend items.

  通过模仿，你可以加入与儿童的互动中。你模仿儿童时，刻意吸引儿童的注意力，因为你的行为正是儿童感兴趣的。

  Mirroring allows you to join the interaction with the child. When you imitate the child, the child is more likely to turn toward you because you are doing what is of interest to the child.

- 描述

  Mapping

  模仿儿童的同时，成人描述这个行为，或者儿童用该行为使用的物体。

  While imitating the child, the adult makes a statement of their current action/item being played with.

  描述给孩子的活动提供了丰富的语言环境。你说的话对孩子更有意义，因为你与孩子一起参与活动，并且描述的是孩子的行为。

  Mapping provides the child with a language rich description of the activity. What

you say is more meaningful for the child since you are both engaging in the same activity, and the narration is right on top of what the child is doing.

- 改变环境 Environmental Arrangement

改变语言环境就是控制住孩子想要的物品或者活动。

改变语言环境以后，孩子更有可能主动跟你沟通，然后你就可以利用这个机会鼓励孩子用语言沟通。

Control access to a wanted item or activity

EA increases the likelihood that a child will communicate, and prompt the child to engage in target vocalization.

- 回应

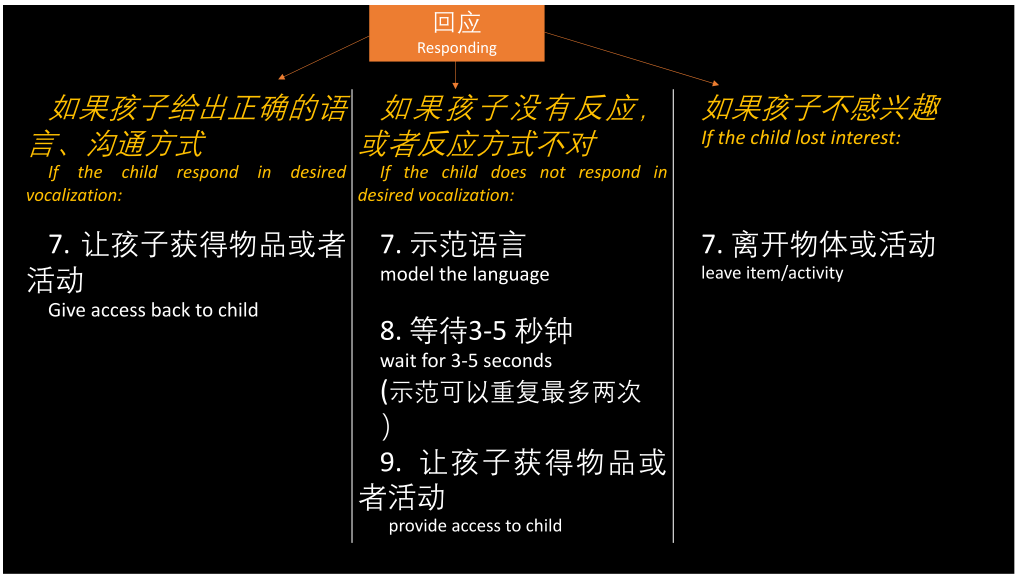
Responding

根据孩子的反应来进行回应

Respond to the child when he/she request

对孩子的要求进行回应会进一步刺激孩子主动跟别人开口沟通或者提出要求。

Responding to a child's request will reinforce the child to initiate and engage in vocal communication.


回应
Responding
如果孩子给出正确的语言、沟通方式
If the child respond in desired vocalization:
7. 让孩子获得物品或者活动
Give access back to child
如果孩子没有反应，或者反应方式不对
If the child does not respond in desired vocalization:
7. 示范语言
model the language
8. 等待3-5 秒钟
wait for 3-5 seconds
(示范可以重复最多两次)
9. 让孩子获得物品或者活动
provide access to child
如果孩子不感兴趣
If the child lost interest:
7. 离开物体或活动
leave item/activity


自然干预法的步骤:
Procedures of Naturalistic Communication Intervention:
1. 接近孩子 Locate near the child
复制
Mirroring
2. 模仿孩子的动作 Imitate the child' s play action
3. 描述复制的行为或者孩子使用的物体 Make a statement about the imitated action/item
描述
Mapping
4. 等待3-5秒钟 Wait 3-5 seconds
改变语言环境
Environmental Arrangement
5. 控制孩子喜欢的物体或者活动 Control access to a wanted item/activity
6。等待3-5 秒钟 Wait for 3-5 seconds

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2. Zhu, L. (n.d.). Coaching Parents and Teachers to Use Naturalistic Strategies
3. Zhu, L. (n.d.). Systematic Review of Adult Training on Early Communication Interventions

In progress
1. Zhu, L., Dai, J., Grisham-Brown, J., Parpti, N. (n.d.). Dual language learner families' satisfaction on family-profession relationship at local Head Start programs

Presentations
1. Zhu, L., Grisham-Brown, J., Shepley, C., & Lane, J. D. (March 2018). A Training package for Teaching Naturalistic Strategies to Parents of Young Dual Language Learners. Presented at the Conference on Research Innovations in Early Intervention, San Diego, CA.
2. Lane, J. D., Shepley, C., Grisham-Brown, J., Zhu, L., (October, 2019), Promoting adult learning using a rapid training and coaching model. Presented at Division of Early Childhood, Dallas, TX.